

Claims

1. A nucleic acid which binds to a bioactive ghrelin.
2. The nucleic acid which specifically binds to a bioactive ghrelin.
3. The nucleic acid according to claim 1, whereby the nucleic acid does not specifically bind to a bioactive ghrelin.
4. The nucleic acid according to claim 2 or claim 3, whereby the specific binding is expressed as the K_d value, whereby the K_d of the nucleic acid is from 10 pM to 1 μ M, more preferable from 100 pM to 500 nM, and most preferable from 1 nM to 100 nM.
5. The nucleic acid according to any of claims 1 to 4, whereby the bioactive ghrelin is n-octanoyl ghrelin.
6. The nucleic acid according to claim 5, wherein the n-octanoyl moiety of the n-octanoyl ghrelin is attached through an ester bond to Ser at position 3 of ghrelin.
7. The nucleic acid according to any of claims 1 to 6, whereby the nucleic acid is a L-nucleic acid, preferably a spiegelmer.
8. The nucleic acid according to any of claims 1 to 7, whereby the nucleic acid is selected from the group comprising deoxyribonucleic acid, ribonucleic acid and mixtures thereof.
9. The nucleic acid according to any of claims 1 to 8, whereby the nucleic acid has a secondary structure shown in Fig. 1B.
10. The nucleic acid according to any of claims 1 to 9, whereby the nucleic acid is variable in the internal loop structure of the secondary structure shown in Fig. 1B.
11. The nucleic acid according to any of claims 1 to 10, whereby the nucleic acid comprises, preferably consists of, a sequence according to SEQ. ID. No 1.

12. The nucleic acid according to any of claims 1 to 11, whereby the nucleic acid comprises, preferably consists of, the sequence according to SEQ. ID. No. 2 to SEQ. ID. No. 15.
13. Use of a nucleic acid according to any of the preceding claims for the binding of bioactive ghrelin.
14. Use according to claim 13, whereby the binding is selective for bioactive ghrelin with a K_d of the nucleic acid from 10 pM to 1 μ M, more preferable from 100 pM to 500 nM, and most preferable in the range of 1 nM to 100 nM.
15. Use according to claim 13 or 14, whereby the binding excludes the binding of ghrelin different from bioactive ghrelin in the presence of a 1000-fold excess of bio-inactive ghrelin over bioactive ghrelin, more preferable in the presence of 100-fold excess of bio-inactive ghrelin over bioactive ghrelin, and most preferable in the presence of 10-fold excess of bio-inactive ghrelin over bioactive ghrelin.
16. Use according to any of claims 13 to 15, whereby the bioactive ghrelin is n-octanoyl ghrelin.
17. Use according to any of claims 13 to 16, whereby the binding is an *in vivo* or an *in vitro* binding.
18. Use of a nucleic acid according to any of claims 1 to 12 for the detection of bioactive ghrelin.
19. Use according to claim 18, whereby the bioactive ghrelin is specifically detected.
20. Use according to claims 18 or 19, whereby the non-bioactive ghrelin is not detected by the nucleic acid, preferably not specifically detected by the nucleic acid.
21. Use according to any of claims 18 to 20, whereby the bioactive ghrelin and/or the non-bioactive ghrelin is detected *in vivo* and/or *in vitro*.

22. Use of a nucleic acid according to any of claims 1 to 12 for the inhibition of bioactive ghrelin.
23. Use according to claim 22, whereby the bioactive ghrelin is specifically inhibited.
24. Use according to claim 23, whereby the non-bioactive ghrelin is not inhibited by the nucleic acid, preferably not specifically inhibited by the nucleic acid.
25. Use according to any of claims 22 to 24, whereby the bioactive ghrelin is n-octanoyl ghrelin.
26. Use according to any of claims 22 to 25, whereby the inhibition is an *in vitro* and/or an *in vivo* inhibition.
27. Use of a nucleic acid according to any of claims 1 to 12 for the manufacture of a medicament.
28. Use according to claim 27, whereby the medicament is for the treatment and/or prevention of a disease and/or a disorder.
29. Use according to claim 28, whereby the disease and/or disorder is selected from the group comprising obesity, regulation of energy balance, appetite, body weight, eating disorders, diabetes, glucose metabolism, tumor, blood pressure, and cardiovascular disease.
30. Use according to claim 28 or 29, whereby the disease and/or disorder is mediated by a bioactive ghrelin.
31. A method for the detection of bioactive ghrelin, comprising the following steps:
 - (a) providing a sample which is to be tested for the presence of bioactive ghrelin,
 - (b) providing a nucleic acid according to any of the claims 1 to 12,
 - (c) reacting the sample with the nucleic acid,

whereby step (a) can be performed prior to step (b), or step (b) can be performed prior to step (a).

32. The method according to claim 31, wherein a further step (d) is provided:

(d) detecting the reaction of the sample with the nucleic acid.

33. The method according to claim 32, wherein the nucleic acid of step (b) is immobilized to a surface.

34. The method according to claim 33, wherein the nucleic acid is immobilized to a surface via a covalent chemical bond between the surface and the nucleic acid.

35. The method according to claim 34, wherein the nucleic acid is immobilized to a surface by an interaction partner of the nucleic acid.

36. The method according to claim 35, wherein the interaction partner is selected from the group comprising nucleic acids, polypeptides, proteins and antibodies.

37. The method according to claim 36, wherein the interaction partner is an antibody, preferably a monoclonal antibody, whereby the antibody is binding to the nucleic acid according to any of claims 1 to 12.

38. The method according to claim 36, wherein the interaction partner is a nucleic acid, preferably a functional nucleic acid.

39. The method according to claim 38, wherein the functional nucleic acid is selected from the group comprising aptamers, spiegelmers, and nucleic acids which are at least partially complementary to the nucleic acid.

40. The method according to claim 33, wherein the nucleic acid comprises a first member of a pair of interaction partners and the surface comprises a second member of the pair of interaction partners.

41. The method according to claim 40, wherein the pair of interaction partners are selected from the group of interaction partners comprising biotin and avidin, biotin and streptavidin, and biotin and neutravidin.
42. The method according to claim 41, wherein the first member of the pair of interaction partners is biotin.
43. The method according to any of claims 33 to 42, wherein an immobilized complex of bioactive ghrelin and the nucleic acid is formed.
44. The method according to claim 43, wherein the complex is detected.
45. The method according to claim 44, wherein the bioactive ghrelin is detected.
46. The method according to claim 45, wherein the bioactive ghrelin is detected by a detection means which is specific for bioactive ghrelin.
47. The method according to claim 46, wherein the bioactive ghrelin is detected by a detection means which detects both bioactive ghrelin and non-bioactive ghrelin.
48. The method according to any of claims 44 to 47, wherein the detection means is selected from the group comprising nucleic acids, polypeptides, proteins and antibodies.
49. The method according to any of claims 44 to 48, wherein after the complex formation the sample is removed from the reaction vessel.
50. The method according to claim 32, wherein an interaction partner of bioactive and/or non-bioactive ghrelin is immobilized on a surface.
51. The method according to claim 50, wherein the interaction partner is selected from the group comprising nucleic acids, polypeptides, proteins and antibodies.
52. The method according to claim 51, wherein the interaction partner is capable of binding bioactive ghrelin and/or non-bioactive ghrelin.

53. The method according to claim 51 or 52, wherein the interaction partner is an antibody, preferably a monoclonal antibody.
54. The method according to claim 51 or 52, wherein the interaction partner is a functional nucleic acid.
55. The method according to claim 54, wherein the functional nucleic acid is selected from the group comprising aptamers and spiegelmers.
56. The method according to any of claims 50 to 55, wherein the interaction partner forms a complex with the bioactive and/or the non-bioactive ghrelin.
57. The method according to any of claims 50 to 56, wherein the bioactive ghrelin is detected by a detection means.
58. The method according to claim 57, wherein the detection means is a nucleic acid according to any of claims 1 to 12.
59. The method according to claim 58, wherein the nucleic acid is detected using a second detection means.
60. The method according to claim 59, wherein the second detection means is selected from the group comprising nucleic acids, polypeptides, proteins and antibodies.
61. The method according to claim 60, wherein the second detection means is an antibody, whereby preferably the antibody is specific for the nucleic acid.
62. The method according to claim 60, whereby the second detection means is a nucleic acid, preferably a molecular beacon.
63. The method according to claim 60, wherein the nucleic acid comprises a detection label.

64. The method according to claim 63, wherein the detection label is selected from the group comprising biotin, a bromo-desoxyuridine label, a digoxigenin label, a fluorescence label, a UV-label, a radio-label, and a chelator molecule.

65. The method according to claim 63, wherein the second detection means interacts with the detection label.

66. The method according to claim 65, wherein

the detection label is biotin and the second detection means is an antibody directed against biotin, or wherein

the detection label is biotin and the second detection means is an avidin or an avidin carrying molecule, or wherein

the detection label is biotin and the second detection means is a streptavidin or a streptavidin carrying molecule, or wherein

the detection label is biotin and the second detection means is a neutravidin or a neutravidin carrying molecule, or

wherein the detection label is a bromo-desoxyuridine and the second detection means is an antibody directed against bromo-desoxyuridine, or wherein

the detection label is a digoxigenin and the second detection means is an antibody directed against digoxigenin, or

wherein the detection label is a chelator and the second detection means is a radio-nuklide.

67. The method according to any of claims 50 to 66, wherein the second detection means is detected using a third detection means, preferably the third detection means is an enzyme, more preferably showing an enzymatic reaction upon detection of the second detection means, or the third detection means is a means for detecting radiation, more preferably radiation emitted by a radio-nuklide.

68. The method according to any of claims 56 to 67, wherein after complex formation the sample is removed from the reaction, more preferably from the reaction vessel where step © and/or step (d) are performed.
69. The method according to claim 32, wherein the nucleic acid according to any of claims 1 to 12 comprises a fluorescence moiety and whereby the fluorescence of the fluorescence moiety is different upon complex formation between the nucleic acid and bioactive ghrelin and free bioactive ghrelin.
70. The method according to claim 32 and 69, wherein the nucleic acid is a derivative of the nucleic acid according to any of claims 1 to 12, whereby the derivative of the nucleic acid comprises at least one fluorescent derivative of adenosine replacing adenosine.
71. The method according to claim 70, wherein the fluorescent derivative of adenosine is ethenoadenosine.
72. The method according to any of claims 69 to 71, wherein the complex consisting of the derivative of the nucleic acid according to any of claims 1 to 12 and the bioactive ghrelin is detected using fluorescence.
73. The method according to any of claims 31 to 72, wherein the bioactive ghrelin is n-octanoyl ghrelin.
74. The method according to any of claims 31 to 73, wherein the non-bioactive ghrelin is ghrelin which is different from n-octanoyl ghrelin.
75. The method according to any of claims 31 to 74, wherein a signal is created in step (c) or step (d) and preferably the signal is correlated with the concentration of bioactive ghrelin in the sample.
76. The method according to any of claims 31 to 75, wherein the sample is selected from the group comprising blood, plasma, serum, liquor, and tissues.

77. The method according to any of claims 31 to 76, wherein the method is a diagnostic method or prognostic method.

78. The method according to claim 77, wherein the method is for diagnosing, staging, and/or prognosing a disease and/or a disorder, whereby preferably said disease and/or disorder is selected from the group comprising obesity, regulation of energy balance, appetite, body weight, eating disorders, diabetes, glucose metabolism, tumor, blood pressure, and cardiovascular disease.